“THE EFFECTIVENESS OF MULLIGAN MOBILIZATION VERSUS STRETCHING ON THE MANAGEMENT OF PIRIFORMIS SYNDROME – A COMPARATIVE STUDY ”

A project submitted towards partial fulfillment of the requirements of for the degree of

MASTER OF PHYSIOTHERAPY

Submitted by
Register number: 271710208

under the guidance of
Prof. Dr. C.SIVA KUMAR , MPT (ORTHO)., MIAP.,Ph.d.,

Submitted to
THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY
Chennai – 32

P.P.G. COLLEGE OF PHYSIOTHERAPY
9/1, Keeranatham road,
Saravanampatti ,
Coimbatore – 641035

May – 2019

"THE EFFECTIVENESS OF MULLIGAN MOBILIZATION VERSUS STRETCHING ON THE MANAGEMENT OF PIRIFORMIS SYNDROME – A COMPARATIVE STUDY"

INTERNAL EXAMINER :

EXTERNAL EXAMINER :

A project submitted in partial fulfillment
of the requirement for the degree of

MASTER OF PHYSIOTHERAPY

To

THE TAMILNADU Dr. M. G. R. MEDICAL UNIVERSITY, CHENNAI-32

MAY 2019

CERTIFICATE I

This is to certify that the dissertation entitled **"THE EFFECTIVENESS OF MULLIGAN MOBILIZATION VERSUS STRETCHING ON THE MANAGEMENT OF PIRIFORMIS SYNDROME – A COMAPARATIVE STUDY "** was carried out by **Reg. No. 271710208, P.P.G College of Physiotherapy, Coimbatore-35,** affiliated to the **Tamilnadu Dr.M.G.R medical university, Chennai-32, under the guidance of Prof. Dr. C.SIVA KUMAR , MPT (ORTHO)., MIAP.,Ph.d.,**

Prof. Dr.C. SIVA KUMAR, M.P.T (ORTHO).,MIAP., PhD.,

Principal

CERTIFICATE II

This is to certify that the dissertation entitled **"THE EFFECTIVENESS OF MULLIGAN MOBILIZATION VERSUS STRETCHING ON THE MANAGEMENT OF PIRIFORMIS SYNDROME – A COMAPARATIVE STUDY"** was carried out by **Reg. No. 271710208, P.P.G College of Physiotherapy, Coimbatore-35,** affiliated to the **Tamilnadu Dr.M.G.R medical university, Chennai-32,** under my guidance and direct submission.

Prof. Dr. C.SIVA KUMAR , MPT (ORTHO)., MIAP.,Ph.d.,
GUIDE

ACKNOWLEDGEMENT

I thank **GOD AND ALMIGHTY** for providing me the wisdom and knowledge to complete this study successfully.

I thank **MY HUSBAND AND MY PARENTS** who had given me the opportunity , guidance, encouragement and support throughout the course of my study.

I express my sincere gratefulness to our chairman **Dr. L.P. THANGAVELU , M.S., F.R.C.S** and our **correspondent MRS. SHANTHI THANGAVELU , M.A.,** P.P.G group of institutions, Coimbatore , for their encouragement and providing the source for the successful of the study.

I express my heartfelt thanks to my **principal Prof. Dr. C.SIVA KUMAR , MPT (ORTHO)., MIAP.,Ph.d.,** for his guidance , support and constant encouragement through out of this project.

My deepest gratitude goes to my project guide, for his valuable and timely suggestions towards my project.

I extend my special thanks and sincere gratitude, to our **research committee members ,** and **all faculties** for making the project coherent & for making the analytical perusal an every stage of this study without their guidance , this project would have not come through.

I sincerely thank my each and every **SUBJECT** who co-operated to fulfill this project work in the given time limit.

I sincerely acknowledge **my friends, batch mates my seniors, and all my Well-Wishers** who were always there to guide and render their support to me throughout my project.

I extend my gratitude to **Mr.K.VENUGOPAL, MA,MPhil**, Professor, Research & Statistics , for letting me know the intricacies of biostatistics and helping me in making my step into the field of research.

Last but not least I also extend my thanks to **PARTICIPANT** for their willingness and co-operation in the study..

LIST OF CONTENTS

LIST OF TABLES

LIST OF GRAPHS

"THE EFFECTIVENESS OF MULLIGAN'S MOBILIZATION VERSUS STRETCHING ON THE MANAGEMENT OF PIRIFORMIS SYNDROME – A COMAPRATIVE STUDY "

ABSTRACT

BACKROUND OF THE STUDY

Low back pain is a leading cause of disability. It occurs in similar proportions in all cultures, interferes with quality of life and work performance, and is the most common reason for medical consultations. Only a few cases of back pain are due to specific causes; most cases are non-specific. Low back pain may results from trauma, osteoporotic fractures, infection, neoplasm's and other mechanical derangements .

METHODOLOGY

In this experimental study, 30 patients with Piriformis syndrome were selected and divided into two groups. One group was given only Piriformis stretching for the tightened muscle and the other group given Mulligan mobilization for lumbo sacral joints. VAS and oswestry disability index were taken to compare before and after the treatment regime of 4 weeks. The baseline measurement was compared to the Data.

RESULTS:

Both the groups had decrease of pain in VAS score, but the group A had more decrease of pain and improvement in function. In both the groups, the statistical result was found to be $P<0.0001$ which means there is a significant differences between the two groups.

CONCLUSION

This study found that the reduction of pain and improvement of function were seen in both the groups but the Mulligan's Mobilization in group A was more effective than Stretching i.e. group B.

KEYWORDS

Piriformis Syndrome, Stretching, Mulligan's Mobilization, Visual Analog scale.

CHAPTER I

INTRODUCTION

1.1 BACKROUND OF THE STUDY

Piriformis syndrome is a peripheral neuritis of the sciatic nerve caused by an abnormal condition of the Piriformis muscle. It is arising due to the entrapment and irritation of the nerve in the greater sciatic notch as a result of inflammation, hypertrophy or anatomical anomaly of the muscle.

Piriformis syndrome can "masquerade" as other common somatic dysfunctions, such as intervertebral discitis, lumbar radiculopathy, primary sacral dysfunction, sacroiliitis, sciatica, and trochanteric bursitis.

There are two types of Piriformis syndrome—primary and secondary. Primary Piriformis syndrome has an anatomic cause, such as a split Piriformis muscle, split sciatic nerve, or an anomalous sciatic nerve path. Secondary Piriformis syndrome occurs as a result of a precipitating cause, including macro trauma, micro trauma, ischemic mass effect, and local ischemia. Among patients with Piriformis syndrome, fewer than 15% of cases have primary causes.

The relationship of the sacro iliac joint dysfunction to Piriformis syndrome is not well established whether it is a causative factor or a resultant. However, the most logical explanation could be that the muscle shortening/tightening unilaterally causes imbalance in the pelvic stability and results in the pulling of the sacrum. It is noted that when there is irritation in the muscle, it tends to shorten and hence bring the attachments closer eventually causing anterior rotation of sacrum and compensatory lumbar rotation to the contra lateral side

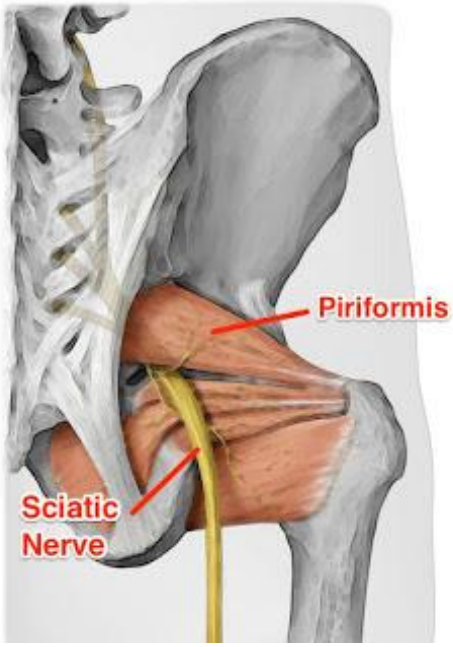
Mulligan's therapy is a manual therapy technique which was developed by Brian Mulligan, for the treatment of musculoskeletal dysfunction It involves performing a sustained force (accessory glide) while a previously painful (problematic) movement is performed

Manual and self-stretching activities to improve trunk and lower extremity flexibility, and range of motion.

Many studies have shown improved effect of stretching on Piriformis syndrome but there is no much literatures to know the effect of mulligan on Piriformis syndrome.

So this study is aimed not only to know the effect of mulligan and also to compare the effect of stretching with mulligan mobilization.

Piriformis Muscle:



Piriformis Syndrome:

1.2 NEED OF THE STUDY

Piriformis syndrome frequently goes unrecognized or misdiagnosed in clinical settings. In this study, emphasis is placed to recognize signs and symptom that are unique to Piriformis syndrome and then find out the effect of Mulligan and also to compare the effect of stretching with Mulligan Mobilization.

1.3 AIMS OF THE STUDY

The Aim of the study was to compare the effect of mulligan's Mobilization of Lumbo sacral Joint versus Piriformis Muscle stretching in subjects with Piriformis syndrome.

1.4 OBJECTIVES OF THE STUDY

- To find out whether the application of mulligan's Mobilization can reduce pain and improve function in patients with Piriformis syndrome.
- To find out whether the application of Piriformis muscle stretching can reduce pain and improve function in patients with Piriformis syndrome.
- To compare the effects of Mulligan's Mobilization and Piriformis muscle Stretching.

1.5 HYPOTHESIS

ALTERNATE HYPOTHESIS

There will be significant reduction in pain and improve in Function by Mulligan's Mobilization and stretching of Piriformis Muscle in subjects with Piriformis syndrome.

NULL HYPOTHESIS

There will be no significant reduction in pain and improve in Function by Mulligan's Mobilization and stretching of Piriformis Muscle in subjects with Piriformis syndrome.

1.6 OPERATIONAL DEFINITION

PIRIFORMIS SYNDROME

It is a disorder that occurs when your sciatic nerve is compressed and/or irritated by the Piriformis muscle as it passes deeply through your buttock, resulting in pain. Sometimes the condition is called **'pseudo sciatica'**, as it is often confused with pain in the nerve resulting from a low back disc bulge. **Cass,SP 2015**

MUULIGAN'S MOBILIZATION

It is the techniques which is designed to reduce pain and improve the patient's range of motion the Mulligan technique involves Natural Apophyseal Glides (NAGS), Sustained Natural Apophyseal Glides (SNAGS) and Mobilization with Movement (MWM) for the treatment of musculoskeletal injuries. **Brian Mulligan 1954**

STRETCHING

Stretching is a form of physical exercise in which a specific muscle or tendon (or muscle group) is deliberately flexed or stretched in order to improve the muscle's felt elasticity and achieve comfortable muscle tone. The result is a feeling of increased muscle control, flexibility, and range of motion. **Kolt Gregory. S 2004**

OSWESRTY DISABILITY INDEX

The Oswestry Disability Index (ODI) is a self-rating condition-specific outcome measure for evaluation of low back pain disability. and consists of ten sections with six response alternatives describing functional impairment in a series of daily activities. **Fairbank et al. (1980),**

CHAPTER II

REVIEW OF LITERATURE

2.1 REVIEW RELATED TO PREVALANCE OF PIRIFORMIS SYNDROME

USHAM SHY AMKESHO SINGH, et ala (2018):

He conducted a study in Punjab at Joint care Physiotherapy Rehabilitation center on Prevalence of Piriformis syndrome among the cases of low back / buttock pain with sciatica.prevalance of Piriformis syndrome was 6.25 concluded that out of 2910 patients, 182 cases in the age of 19 – 75 years with a mean age of 43 years were clinically diagnosed as Piriformis syndrome.

MALIKA MONDAL., et al (2018):

She did her survey in Spine and Joint physiotherapy Clinic at Kolkata on Prevalence of Piriformis syndrome Tightens in Healthy Sedentary individuals, includes 200 subjects and were evaluated on the basis of the inclusion and exclusion criteria. Tightness of Piriformis muscle was assessed using Piriformis stretch test and seated Piriformis stretch was found to be present in 159 subjects (85.5 %).Prevalence of Piriformis tightness was highest in third decade. The study concluded that, sedentary population the prevalence of Piriformis tightness is very high and adult population has more chances to get affected with Piriformis muscle tightness that can lead to development of Piriformis syndrome and later on low back pain.

KEAN CHEN C,et al (2018):

He did his study in Northwestern Polytechnical University on Prevalence of Piriformis syndrome in chronic low back pain patients. A clinical diagnosis with modified FAIR test. The study includes 93 consecutive patients who attended the pain management unit for chronic low back pain .the diagnosis of Piriformis syndrome was made using the modified flexion, adduction, internal rotation (FAIR) test, which is a combination of Lasegue sign and FAIR test.Prevalance of Piriformis syndrome based on this technique, was compared with the previous data using other techniques. study

concluded that the prevalence of Piriformis syndrome was 17.2& among low back pain patients.

KEVORK HOPAYIAN et al (2018):

They done a systemic review in University of Nicosia on the clinical features of the Piriformis Syndrome, in which the most common features found by them were: buttock pain, eternal tenderness, over greater sciatic notch, aggravation of pain through sitting and augmentation of pain with manoeuvres that increase Piriformis muscle tension.

PAPADAPOULOS E C et al (2018)

They reported specific physical findings in Weill Medical College of Cornell of Piriformis syndrome are tenderness in the sciatic notch and the buttock pain in flexion, adduction and internal rotation (FADIR) of the hip, and it may constitute up to 5% of low back pain and leg pain. They concluded that stretching is the mainstay of conservative treatment and hesslps in reducing the vicious cycle of pain and spasm in treatment of Piriformis syndrome.

VALLEJO MC et al (2017)

They presented a case for diagnosis pathogenesis and treatment of Piriformis syndrome where there as persistent buttock and hip pain after spinal anaesthesia in 29 years old women after caesarean delivery can cause sciatic nerve compression at the SI Joint with concomitant irritation, inflammation and spasm of Piriformis muscle. Piriformis syndrome is frequently under diagnosed in the obstetric population.

2.2 REVIEW OF LITERATURE TO MULLIGANS MOBILIZATION

HALL T et al 2018)

He conducted a randomized trial to investigate the effect over 24 hour on range of motion and pain , of a single intervention of mulligan's bend leg raise (BLR) technique in subjects with limited straight leg raise and low back pain (LBP), 24 subjects were blinded and randomly allocated to either a BLR or placebo group. Pain and range of SLR and was measured prior to immediately following and 24 h after the interventions. There is a marked difference between the two groups immediately after the interventions.

HUSSEIN HM et al (2018)

He conducted a study on the effect of mulligan's concept lumbar SNAG on chronic non specific low back pain. The preliminary study indicated improvement in both groups. Adding SNAG to conventional programs in the treatment of chronic nonspecific LBP may result in greater improvement of responding error, pain reduction and improved function.

TRUPTIWARUDE et al (2017)

He conducted a study in Krishna College of Physiotherapy , Karad to provide evidence to support the use of Mulligan's Mobilization approach in relieving pain, improving ROM and reducing functional disability with 15 outpaients and for treatment of about 4 weeks.

2.3 REVIEW RELATED TO STRETCHING

MOHANTY PP et al (2018)

He did a study on Effect of Stretching of Piriformis and illiopsoas in coccydynia. Total 48 persons with coccydynia diagnosed were recruited and randomly assigned into one of the 3 groups. Experimental group I were treated by stretching of Piriformis and illiopsoas muscle , Experimental group II were treated by stretching of Piriformis and illiopsoas muscle and Maitland's rhythmic oscillatory thoracic mobilization over the hypomobile segments and the conventional group were treated by set cushioning + Sitz Bath + Phonophorosis. All participants underwent an initial baseline assessment for Pressure Pain Threshold (PPT) by using modified syringe algometer and pain free sitting duration. All the subjects were advised to minimize sitting posture and use a seat cushion. Treatment was given for 3 weeks, 5 sessions per week and post-treatment evaluation was done after completion of 3 weeks. Follow up evaluation was done after 1 month. The study concluded that the overall results of the study showed that there was significant improvement in pain pressure threshold and pain free sitting in both the experimental groups with treatment and improvement continued after cessation of therapy, whereas the conventional group did not improve significantly.

JUN CHUL PARK at al (2018)

He did a study on the effects of three types of Piriformis muscle stretching on muscle thickness and the medial rotation angle of the coxal articulation. A study includes a total of 45 subjects who participated in the study randomly allocated into three groups: stretching with flexion of coxal articulation over (SFCO) 90°,stretching with flexion of coxal articulation under (SFCU) 90°, and MET application. For the SFCO, the subjects bent two legs in a supine position and put the leg of one side on the opposite side knee that would be measured. The subjects bent their knee over 90° until they felt tension in the direction toward the shoulder on the same side as the leg that was being stretched and then maintained the position for 30 seconds. This was repeated twice with a 30-seconds resting time in between. For the SFCU, the leg that would be stretched was crossed over the opposite side knee in a supine position. The subjects touched the outside of the knee toward the ground for 30seconds.This was repeated twice with a 30- second resting time in between. The study concluded that Stretching improves physical performance ability, prevents injury, and reduces muscle pain and increases flexibility.

BRETT M.GULLEDGE et al (2017)

His research thesis is on comparison of two stretching methods and optimization of stretching protocol for the Piriformis muscle, seven subjects underwent three CT scans: one supine, one with hip flexion, external rotation, then adduction (ExR stretch).A computer program was developed to map Piriformis length over a range of Hip joint position and was validated against the measured scans. External Rotation and Adduction stretches elongate the Piriformis similarly and therefore may have similar clinical effectivenss.The optimized stretches led to larger increase in Piriformis Length and may be more easily performed by some patients due to increased hip flexion.

2.4 REVIEW RELATED TO NUMERIC PAIN RATING SCALE

MARIA ALEXANDRA FERREIRA –VALENTE et al (2018)

He did a study in University of de coimbra on validity of four pain intensity rating scales. Study shas concluded that statistically significant differences in pain

intensity between temperatures for each scale, with lower temperatures resulting in higher pain intensity. The order of responsivity was as follows: NRS , VAS, and FPS-R. However, there were relatively small differences in the responsivity between scales. A statistically significant sex main effect was also found for the NRS,VRS , and FPS-R. The findings are consistent with previous studies supporting the validity of each scale. The most support emerged for the NRS as being both (1) most responsive and (2) able to detect sex differences in pain intensity. The result also provides support for the validity of the scales for use in samples.

SARA R.PIVA,ALEXANDRA B.GIL et al., (2018)

He did a study in University of Pittsburgh on responsiveness of the activities of daily living scale of the knee outcome survey and numeric pain rating scale in patients with patellofemoral pain study includes a total of 60 individuals with patellofemoral pain (33 women ; mean age 29.9 (standard deviation 9.6 years) the activity of daily living scale ansd the numeric pain rating scale were assessed before and after 8 weeks of physical therapy program. Patients completed a global rating of change scale at the end of therapy. The standardized effect size, guyatt responsiveness index, and the minimum clinical important difference were calculated. The study concluded that information from this study may be helpful to therapists when evaluating the effectiveness of rehabilitation intervention on physical function and pain, and to power future clinical trials on patients with patellofemoral pain.

Dr.SHRADDHA TATKARE et al., (2018)

A comparative study between various pain rating scales as response options in patients with diabetic neuropathy, the study in Maharastra includes a randomly chosen 60 patients of diabetic neuropathy attending medicine OPD were given a questionnaire containing three options of pain rating scales as simple Visual Analog Scale (VAS),Numerical Rating scale (NRS) and Likert Scale (LS) to describe intensity of their pain. They were asked to comment about the simplicity and adequacy of the response options, The NRS is more preferred option by patients and concluded that in the LS there were limited options and simple VAS was slightly difficult to mark for the old poorly educated population of the study sample.

2.5 REVIEW RELATED TO VISUAL ANALOG SCALE

BIJUR P E., et al (2018)

He reported reliability of the Visual Analogue Scale for acute pain measurement as assessed by the ICC appears to be high 90% of the pain ratings were reproducible within 9mm which suggest that the VAS is sufficiently reliable to be used to assess acute pain.

CHILGRES MK., et al (2018)

In their study in Rehabilitation center in Sharda University, Greater Noida patients with Piriformis syndrome visual analog pain scales (VAS) were used to measure pain intensity and interference with activities for about 12 patients in a treatment of 6 weeks. The patients outcome were measured through VAS and found to be effective.

BOONSTRA., et al (2017)

He reported that the reliability of Visual Analogue Scale for disability in patients with chronic musculoskeletal pain is moderate to good. He conducted in 10 patients as a sample group in Physiotherapy center in Noida for 1 month for the treatment of Mulligan's Mobilization on Knee Joint for patients with Knee pain and found to be effective in outcome measures and significantly good response from the patients.

CHAPTER III

MATERIALS AND METHODOLOGY

3.1 STUDY DESIGN

A study design was an Experimental Study

3.2 STUDY POPULATION

Piriformis Syndrome patients

3.3 SAMPLING SIZE

The sampling size was 30 subjects

3.4 SAMPLING TECHNIQUE

Non probability purposive Sampling Technique

3.5 STUDY SETTING

The study is conducted at ASHWIN MULTISPECIALITY HOSPITAL

3.6 STUDY DURATION

The study duration was 4 months.

3.7 SELECTION CRITERIA

3.7.1 Inclusion criteria

- People with secondary Piriformis syndrome and sciatic neuritis due to Macro trauma and Micro trauma to Piriformis muscle,
- Ischemic mass effect and local ischemia to Piriformis muscle,
- Anatomical anomaly of sciatic nerve and Piriformis muscle,
- Associated lumbar (rotational) dysfunctions

3.7.2 Exclusion criteria

- Any hip joint (articular) pathology including pain,
- Fracture, instability,
- Lumbar Disc herniation, Lumbar Spondylosis,
- Lumbar Ankylosing spondylitis,
- Lumbar Spinal stenosis
- Bilateral Piriformis syndrome

3.8 PARAMETES

- Visual Analog scale
- Numeric Rating Scale
- Oswestry Disability Index

3.9 MATERIALS

- Treatment table,
- Lower limb functional scale
- VAS scale Scoring Sheet
- Numeric pain scale scoring sheet
- Mulligan belt.
- Recording materials (Assessment sheet , pen)
- Couch
- Pillow

3.10 PROCEDURE

The subjects referred to PPG College Of Physiotherapy, outpatient department were considered for study. Informed consent was taken from the participants and they were grouped into two groups i.e. group A and group B. Subjects were assessed for baselines data's of VAS & NRS.

3.11 TREATMENT TECHNIQUE

GROUP A : MULLIGANS MOBILIZATION OF LUMBO SACRAL JOINT

In this group, the subjects received lower lumbar and sacro iliac mobilisations. There are different methods to mobilise the lumbar spine

Starting Position:

- Patient in sitting, facing away from therapist.
- The pelvis is stabilised via a belt being placed around the patients ASIS's and around the therapist's ischial tuberosity.
- Therapist to palpate between adjacent spinous processes of the targeted lumbar spinal segments.
- The patient actively flexes the lumbar spine and extends to a neutral position.
- The therapist maintains the tension on the belt throughout the movement.
- The problematic level is palpated and when the patient actively moves into flexion, a sustained PA force is applied throughout the whole movement of flexion to the spinous process.
- This is repeated for three to four times per session as the pain free movement is noticed to improve the maximum range of movement in the lumbar spine

PHOTOGRAPHIC REPRESENTATION

GROUP B : STRETCHING OF PIRIFOEMIS MUSCLE :

In this group the subjects received Piriformis stretching. As starting, the patient was put in supine lying position. The involved limb's hip and knee are flexed and the foot placed firmly on the treatment table crossing over the contra lateral side. The pressure is applied over the knee for the hold-relax technique with a slack in the restricted ROM of adduction and flexion. Following which, passive stretching is provided for 20 – 30 seconds hold.

PHOTOGRAPHIC REPRESENTATION

CHAPTER IV

DATA ANALYSIS AND RESULTS

4.1 STATISTICAL TOOLS

The Statistical tools used in the study are paired t-test and unpaired t –test.

PAIRED 't' Test:

Statistical analysis is done by using Paired 't' test

$$t = \frac{\bar{d}\sqrt{n}}{S}$$

$$S = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

=difference between the pre test Vs post test values

d=mean difference

n=number of observation

s=standard deviation

UNPAIRED 't' – Test

Statistical analysis is done by using Unpaired 't' test

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S}\sqrt{\frac{n_1 n_2}{(n_2 + n_2)}}$$

$$S = \sqrt{\frac{\sum(X_1 - \overline{X}_2)^2 + \sum(X_2 - \overline{X}_2)^2}{n_1 + n_2 - 2}}$$

n 1 = Total Number of subjects in group A

n 2 = Total number of subjects in group B

x 1 = Difference between pre test and post test of Group A

x 1	=	Mean difference between pre test and post test of Group A
X 2	=	Difference between pre test and post test of Group B
X 2	=	Mean difference between pre test and post test of Group B
S	=	Standard Deviation

4.2 ANALYSIS OF DESCRIPTIVE DATA

The collected data's were subjected to normal statistical analysis i.e. mean standard deviation etc. They are discussed briefly below:

Comparison of Group – A patients – Pre – Treatment and Post – Treatment of Mulligans Mobilization

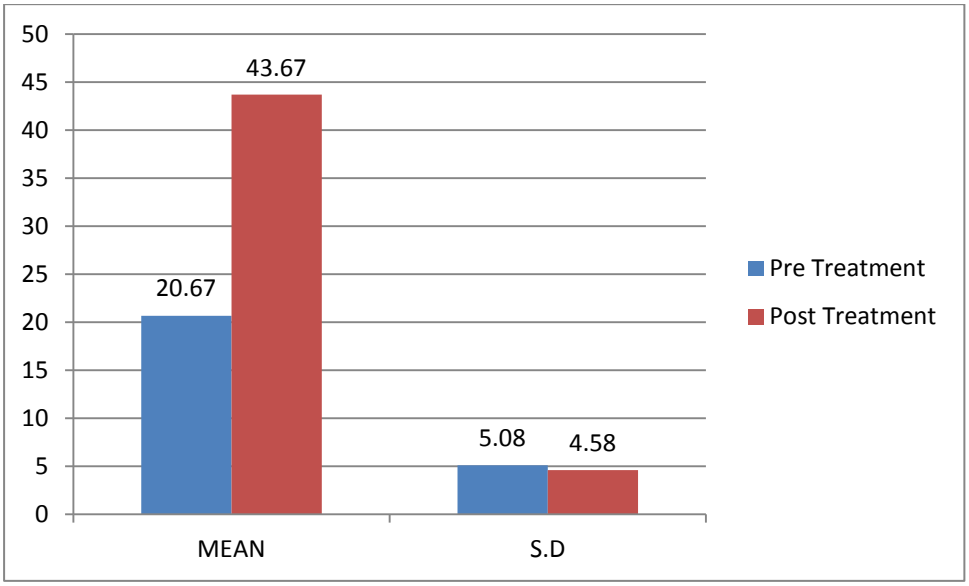
TABLE I

Comparison of Pre – Test & Post Test Values of Group – A

SL NO	GROUP A	MEAN	S,D	't' value
1	Pre Treatment	20.67	5.08	5.37
2	Post Treatment	43.67	4.58	

GRAPH – I

Group – A



Comparison of Group – B patients – Pre – Treatment and Post – Treatment of Mulligans Mobilization

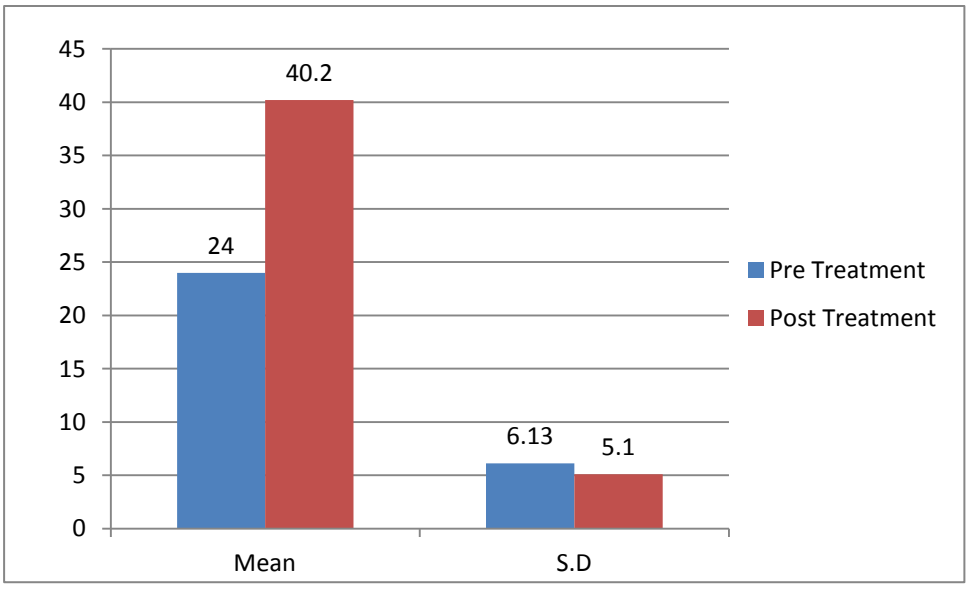
TABLE II

Comparison of Pre – Test & Post Test Values of Group – B

Sl No	Group A	Mean	S.D	't' value
1	Pre Treatment	24	6.13	3.65
2	Post Treatment	40.20	5.10	

GRAPH – II

Group - B



Comparison of Group – A patients – Pre – Treatment and Post – Treatment of Piriformis Stretching

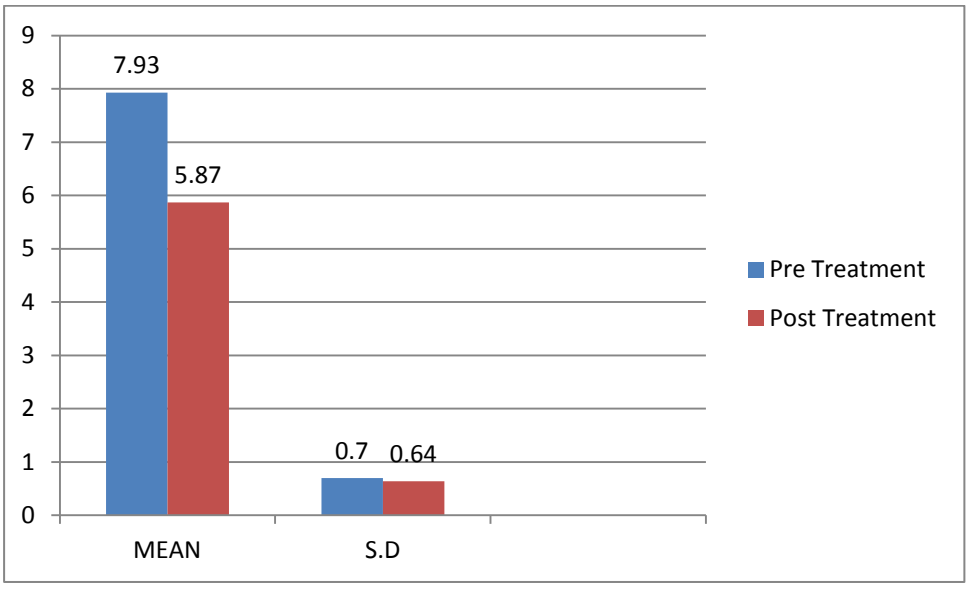
TABLE III

Comparison of Pre – Test & Post Test Values of Group – A

SL NO	GROUP A	MEAN	S,D	't' value
1	Pre Treatment	7.93	0.70	3.29
2	Post Treatment	5.87	0.64	

GRAPH – III

Group - A



Comparison of Group – B patients – Pre – Treatment and Post – Treatment of Piriformis Stretching

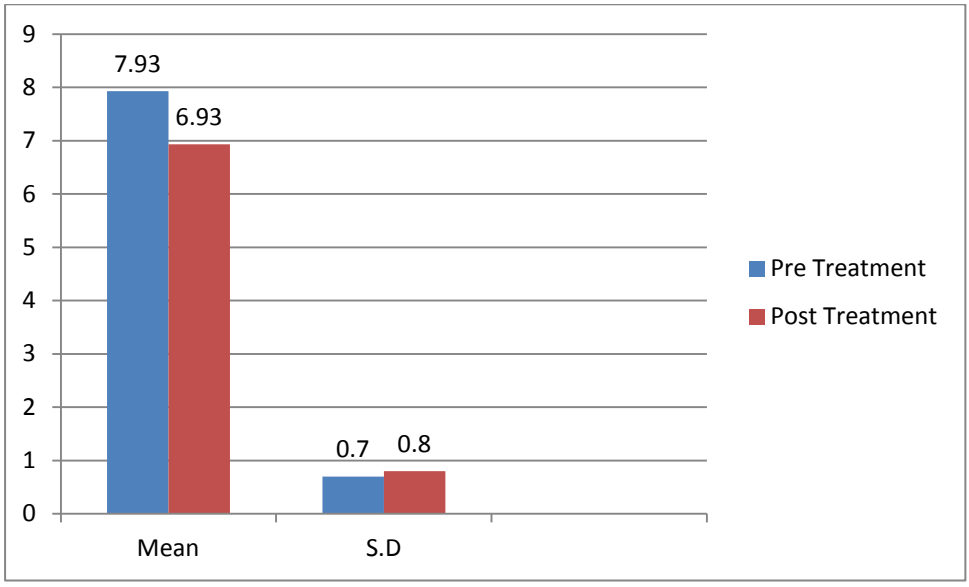
TABLE IV

Comparison of Pre – Test & Post Test Values of Group – B

Sl No	Group A	Mean	S.D	't' value
1	Pre Treatment	7.93	0.70	2.13
2	Post Treatment	6.93	0.80	

GRAPH – IV

Group - B



Comparison of Group – A patients – Pre – Treatment and Post – VAS SCORE

TABLE V

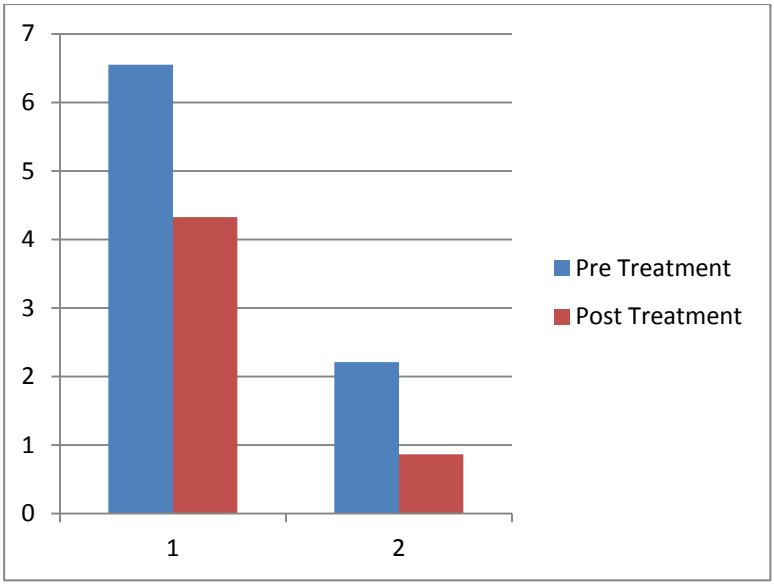
Comparison of Pre – Test & Post Test Values of Group – A

SL NO	GROUP A	MEAN	S.D	't' value
1	Pre Treatment	6.548	2.211	9.125
2	Post Treatment	4.325	0.865	

s

GRAPH – V

Group – A



Comparison of Group – B patients – Pre – Treatment and Post – VAS SCORE

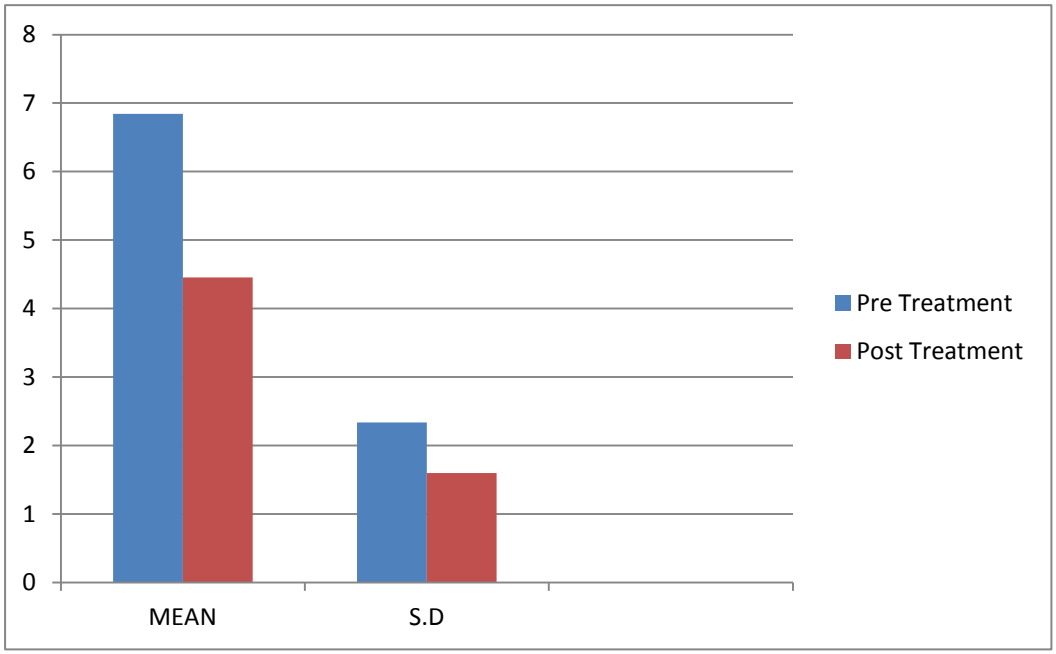
TABLE VI

Comparison of Pre – Test & Post Test Values of Group – B

SL NO	GROUP A	MEAN	S.D	't' value
1	Pre Treatment	6.844	2.338	9.540
2	Post Treatment	4.454	1.598	

GRAPH – VI

Group – B



Comparison of Group – A patients – Pre – Treatment and Post – VAS SCORE

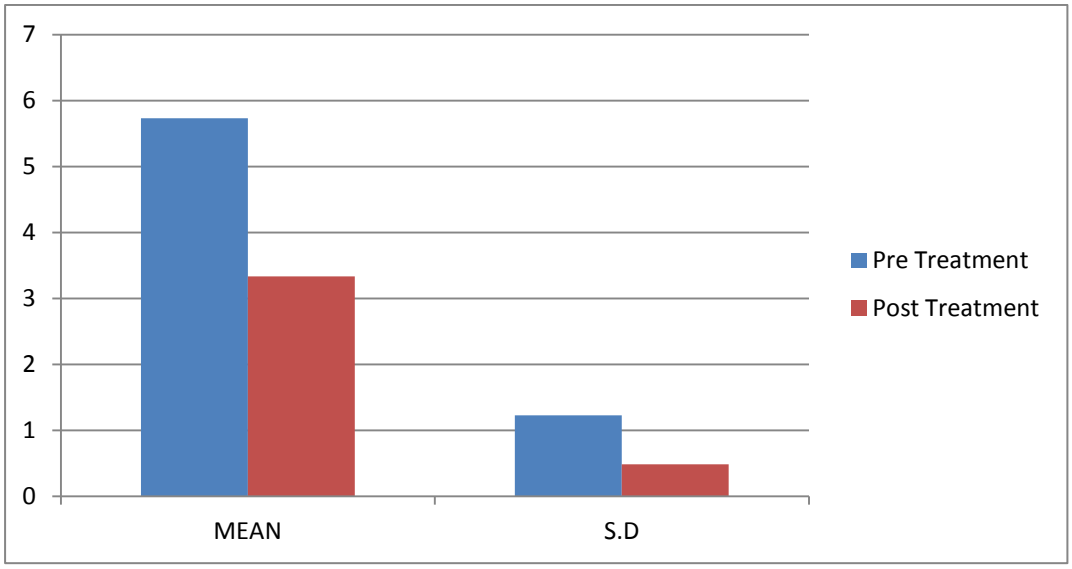
TABLE VII

Comparison of Pre – Test & Post Test Values of Group – A

SL NO	GROUP A	MEAN	S.D	't' value
1	Pre Treatment	5.733	1.227	9.430
2	Post Treatment	3.333	0.487	

GRAPH – VII

Group – A



Comparison of Group – B patients – Pre – Treatment and Post – VAS SCORE

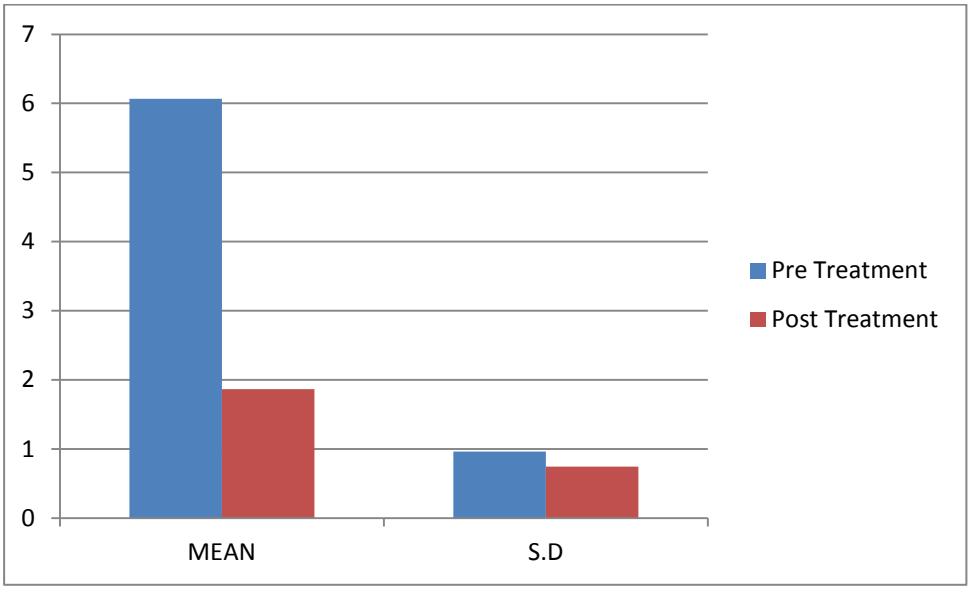
TABLE VIII

Comparison of Pre – Test & Post Test Values of Group – B

SL NO	GROUP A	MEAN	S.D	't' value
1	Pre Treatment	6.066	0.961	13.475
2	Post Treatment	1.866	0.743	

GRAPH – VIII

Group – B



CHAPTER V

DISCUSSION

In this study the effect of mulligan mobilization and the effect of stretching of Piriformis muscle were studied and the results compared. Piriformis syndrome is characterized by pain and dysfunction. The symptoms resemble the sciatica like clinical picture. Apart from the pain in the gluteal region and in the distal sciatic distribution, unilateral Piriformis tightness can lead to anterior rotation of the sacrum and a compensatory lumbar counter rotation on the affected side.

The conventional treatment method of stretching the Piriformis muscle should be the straight forward approach to this problem. However, the consequence and effect of the muscle tightness leading to joint dysfunction is often ignored. Joint mobilization using Mulligan's approach is another established treatment method to deal with this issue. The objective of this study is to compare the above-mentioned two measures in the management of pain relief and movement dysfunction in unilateral Piriformis syndrome. Unlike the bilateral tightness of the muscle, the one sided shortening can cause dysfunctions either in hip rotation or lumbo sacral movements or both.

When compared within the same group pre and post interventions (time difference of 16 weeks), there is considerable improvement in both groups regarding pain relief and functional improvement.

However, the table of comparison between the two groups shows that there is statistically significant difference between the treatment approaches.

When pre intervention mean was compared for VAS score, it was found that there was statistically significant difference in means of Visual analogue score for pain when pre-intervention means were compared between groups.

In group A, which underwent only mobilization, the lumbo sacral dysfunction is the only issue targeted. Due to the dysfunction in the sacro iliac and lumbo sacral joints could lead to limited functions as well, the patients demonstrated a poor ODI score and high VAS score before treatment. Since the Mulligan's mobilization improved the range of movement of the dysfunctional joints of lower lumbar and sacro iliac joints, the patients scored higher ODI score after treatment and lesser in the

pain scale. However, it should be kept in mind that the tightness of Piriformis for these patients could still be remaining untreated.

In the present study VAS, NRS and ODI were used to assess the quantify disability of Low back pain for 16 weeks .In the Oswestry Disability Index , pain intensity and disability had reduced and showed significant improvement within the Group A and Group B separately. When compared. Group A showed better reduction in pain and improvement in disability than Group B. The reduction of pain was measured using Visual Analog Scale (VAS) & NRS. The subjects showed significant pain relief within Group A and Group B respectively. It also illustrated that there was a significant difference in Group A from 8 to 2 than in Group B from 8 to 4 when compared.

In the present study, it is proved the Mulligan's Mobilization is an effective therapeutic option in the treatment of Piriformis syndrome. This is supported by **Sumankumar et al** who performed a randomized control trial study to check out effectiveness into two groups. Group A received therapeutic ultrasound, strengthening exercise and Group B received conventional treatment as group A added with Mulligan's Mobilization for 15 minutes for 10 consecutive days and results concluded that Mulligan's mobilization is an effective therapeutic option in the treatment of Piriformis Syndrome.

In the present study , it si also proved that Piriformis stretch produced significantly better effect in reducing pain ,This study was demonstrated by **Benedict F Digiovanni** performed a prospective clinical study using two different stretching approaches such as Piriformis Stretching, Gluteal maximus stretching protocol in the treatment of Piriformis syndrome and outcome measure revealed that the Piriformis stretching programme produces beneficial effects in reducing pain , improving function and high rate of satisfaction than in patients with Piriformis syndrome.

CHAPTER VI
SUMMARY AND CONCLUSION

SUMMARY

. This present study is a comparative study on effectiveness of Mulligan's Mobilization versus Stretching on the management of Piriformis Syndrome.

30 subjects were selected based on the selection criteria and randomized sampling method was used to allocate the members into two groups (i.e.) Group A & Group B.

Group A was given Mulligan's mobilization for the lumbo sacral joint and Group B was given Stretching of Piriformis muscle. The pre test and post test values are evolved by using VAS, NRS and ODI.

CONCLUSION:

This study concluded that the subjects in the Group A given Mulligan's Mobilization to the lumbo sacral joint showed the reduction of pain and improvement of function were more when compared to the Group B given Stretching to the Piriformis muscle.

Hence the study concluded that Mulligan's Mobilization was effective in reducing pain and improvement in function in patients with Piriformis syndrome.

CHAPTER VII
LIMITATIONS AND SUGGESTIONS

LIMITATIONS

- Patients included in this study were limited to those referred to a single outpatient department of PPG College of Physiotherapy , Coimbatore evaluated and treated by a single investigator.
- The study was conducted on a small sample size which might affect the generalization of results.
- The study was limited to particular age group.
- This study measure the pain score alone and the results were infused.
- In this study the pain was calculated using numeric pain rating scale further studies can be done using other outcome measures.

SUGGESTIONS

- Long term follow up is needed to evaluate whether there occurs sustained or carry over effect after treatment.
- To establish greater efficacy of treatment, the study should be undertaken in large scale random size clinical trial that would include a large sample size and a longer follow-up.
- Studies should be conducted on both acute and chronic cases.
- Studies can be conducted on individuals of all age group.
- For more reliability and validity, long term study must be carried out.
- Further study can be done to check the effects of the techniques on other soft tissue related and joint restriction related conditions.

CHAPTER VIII

BIBLIOGRAPHY

References

1. Low back pain "George E. Ehrlich1"Bulletin of the World Health Organization 2003;81:671-676
2. Ehrlich GE, Khaltaev NG. Low back pain initiative. Geneva:World Health Organization; 1999.
3. Papadopoulos EC, Khan SN. Piriformis syndrome and low back pain: a new classification and review of the literature. Orthop Clin North Am. 2004;35:65-71.
4. Pace JB, Nagle D. Piriformis syndrome. West J Med. 1976;124:435-439.
5. Papadopoulos EC, Khan SN. Piriformis syndrome and low back pain: a new classification and review of the literature,Orthop Clin North Am. 2004 Jan;35(1):6571.
6. Beauchesne RP, Schutzer SF. Myositis ossificans of the piriformis muscle: an unusual cause of piriformis syndrome: a case report. J Bone Joint Surg Am. 1997;79:906-910
7. Kuncewicz E, Gajewska E, Sobieska M, Samborski W, Piriformis muscle syndrome. Ann Acad Med Stetin. 2006;52(3):99-101.
8. Williams PL, Warwick R. Gray's Anatomy. 36th ed.
9. Philadelphia, Pa: WB Saunders Co; 1980.
10. Steiner C, Staubs C, Ganon M, Buhlinger C. Piriformis syndrome: pathogenesis, diagnosis, and treatment. J Am Osteopath Assoc. 1987;87:318-323.
11. TePoorten BA. The piriformis muscle. J Am Osteopath Assoc. 1969;69:150-160.
12. Rodrigue T, Hardy RW. Diagnosis and treatment of piriformis syndrome. Neurosurg Clin N Am 2001; 12:311 –319.
13. R J Spinner, N M Thomas, D G Kline Failure of surgical decompression for a presumed case of piriformis syndrome. 2001; 94(4): 652-654.
14. Marc Nowak. Piriformis Syndrome, Ligament Sprains to Arthritic Pains 2011
15. Grant JH. Leg length inequality in piriformis syndrome. J Am Osteopath Assoc. 1987;87:456

16. Exelby L. The locked lumbar facet joint: intervention using mobilizations with movement. Manual Therapy 2001;6(2):116–21
17. Retzlaff EW, Berry AH, Haight AS, Parente PA, Lichty HA, Turner DM, et al. The piriformis muscle syndrome. J Am Osteopath Assoc. 1974;73:799-807

CHAPTER IX

ANNEXURE I

INFORMED CONSENT FORM

TITLE:

PURPOSE OF THE STUDY:

I ……. have been informed that

this study will help clinicians, & therapists to find out the **"The effectiveness of mulligan mobilization versus stretching on the management of piriformis syndrome – A Comparative Study"**

PROCEDURE:

I …… understand that I'll undergo the experiment with **Prof. Dr.C. Siva Kumar, M.P.T (ORTHO).,MIAP., PhD.**, under the direct supervision of the physiotherapist. I am aware that I have to follow therapist's instruction as has been told to me.

RISK AND DISCOMFORT:

I…….. understand that there are no potential risks associated with this procedure, and understand that ……..I,. will accompany me during this procedure. There are no known hazards associated with this procedure.

CONFIDENTIALITY:

I …….. understand that the medical information produced by this study will be confidential. If the data are used for publication in the medical literature or for teaching purpose, no names will be used. And photographs, audio and videotapes will be used without identity for publication and presentation.

PHOTOGRAPHY CONSENT:

…….Have explained to me that photography are required in order to illustrate various aspects of the study for the thesis and other articles, and at the presentation/ ……. or conference. By giving my consent I authorize ……...to use any of the photographs taken of me in printed format, in slides for presentation.

REQUEST FOR MORE INFORMATION:

I……. understand that I may ask any question about the study at any times……, are available to answer my question. Copy of this concern form will be given to me keep for my careful reading.

REFUSAL OR WITHDRAWAL OF PARTICIPATION:

I…… understand that my participation is voluntary and I may withdraw consent and discontinue participation at any time after he has explained the reasons for doing so.

INJURY STATEMENT:

I understand that the diagnostic/ treatment procedure, under the guidance of my therapist, is likely to cause any / no injury. In such case medical attention will be provide, but no compensation will be provided.

I understand my agreement to participation in this study and I am not waiving any of my legal rights. I confirm that……., have explained me the purpose of the study, the study procedure and possible rick that I may experience.

I have read and I have understood this concern to participate as a subject in this study.

---------- ----------

SUBJECT DATE

---------- ----------

WITNESS SIGNATURE DATE

I have explained (……...) the purpose of the research, the procedure required and the possible risks and benefits, to the best of my ability.

…… ……

INVESTIGATOR DATE

INVESTIGATOR:

1. NIMISHA THOMAS
2. Prof.Dr. R JAYABHARATHI,

ANNEXURE-II

ORTHOPAEDIC ASSESMENT

Name :

Age :

Occupation :

Address :

Chief complaints :

History

Present medical history :

Past medical history :

Drug history :

Surgical history :

Personal history :

Family history :

Socio-economic history :

Psychological history :

Environmental history :

Prior level of activity :

Associated problem :

Pain history Site

Side :

Onset :

Duration :

Type :

Nature :

Intensity :

Frequency :

Aggravating factors :

Relieving factor :

Vital signs

Temperature :

Blood pressure :

Heart rate :

Respiratory rate :

Objective examination :

On observation :

Built :

Posture :

Attitude of limbs :

Swelling :

Bony contours :

Soft tissue contours :

Deformities :

Gait :

Tropical changes :

Respiration :

Type :

Depth :

Pattern :

Mode of ventilations :

External appliances :

Patient's expression :

Patient's attitude :

On palpation :

Tenderness :

Warmth :

Edema :

Pulse :

On examination :

Range of motion :

Region	Active		Passive	
	Right	Left	Right	Left

End feel

Muscle power

Deep tendon reflexes

Sensation

Limb length discrepancy

Limb girth measurement

Postural assessment

Lying

Sitting

Standing

Gait

Stride length:

Walking base:

Stride period:

Single and double support:

cadence:

Stance/swing ratio:

Step length :

gait cycle-stance and swing:

step period:

Abnormal gait

Deformity

Functional assessment

Special test

Investigation

Diagnosis

Problem

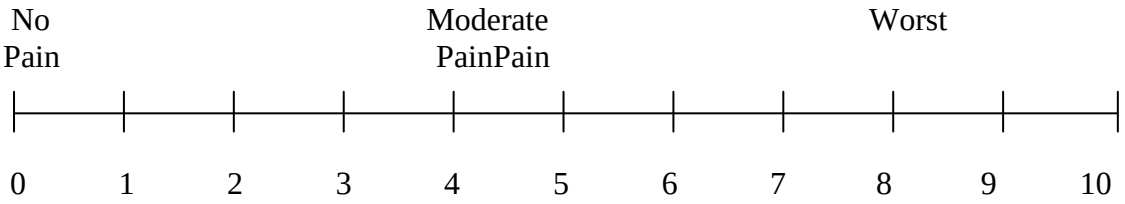
Aims

Means

Home program

ANNEXURE-III

VISUAL ANALOGUE SCALE



Visual analogue scale (VAS) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range a continuum of values and cannot easily be measured directly.

Operationally VAS is usually a horizontal line, 100 mm in length, anchored by word descriptors at each end. It is determined by measuring in millimeters from the left hand end of the line to the point that patient marks.

ANNEXURE-IV

NUMERIC RATING SCALE

1. On a scale of 0 to 10 , with 0 being no pain at all and 10 being the worst pain imaginable, how would you rate your pain RIGHT NOW

0	1	2	3	4	5	6	7	8	9	10
No Pain										Worst Pain Imaginable

2. On the same scale, how would you rate your USUAL level of pain during the last week.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Worst Pain Imaginable

3. On the same scale, how would you rate your BEST level of pain during the last week.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Worst Pain Imaginable

4. On the same scale, how would you rate your WORST level of pain during the last week.

0	1	2	3	4	5	6	7	8	9	10
No Pain										Worst Pain Imaginable

ANNEXURE V

(GROUP A)

S.NO	AGE	SEX	VAS		OSWESTRY DISABILITY INDEX					
					PAIN		DISABILITY		TOTAL	
			PRE	POST	PRE	POST	PRE	POST	PRE	POST
1	32	M	8	2	34	10	54	13	88	23
2	35	F	8	2	36	12	60	16	96	28
3	40	F	7	3	32	9	63	15	90	38
4	38	F	9	3	40	12	45	14	102	36
5	30	F	7	2	40	13	62	10	100	23
6	24	M	8	3	32	8	54	11	82	27
7	40	F	9	2	34	9	53	13	86	35
8	25	M	8	2	35	10	45	12	89	23
9	36	M	7	1	40	8	37	22	102	21
10	38	M	5	2	30	12	42	9	67	26
11	22	F	7	3	38	11	39	12	75	38
12	39	M	8	3	36	10	61	19	100	22
13	33	F	6	2	34	8	32	15	86	32
14	27	M	6	1	36	9	40	14	88	21
15	34	M	7	2	34	12	55	14	94	22

(GROUP B)

S.NO	AGE	SEX	VAS		OSWESTRY DISABILITY INDEX					
			PRE	POST	PAIN		DISABILITY		TOTAL	
					PRE	POST	PRE	POST	PRE	POST
1	40	F	8	2	35	25	73	34	122	69
2	32	M	8	1	36	20	80	35	129	78
3	41	M	9	3	33	20	68	28	124	87
4	37	M	9	3	41	32	56	35	116	45
5	30	F	8	2	42	27	67	41	123	67
6	22	M	7	3	33	22	59	32	102	76
7	42	M	7	2	35	12	68	39	123	59
8	28	F	9	2	36	18	60	41	120	70
9	35	F	8	1	41	23	70	35	102	69
10	37	M	6	2	31	12	45	12	85	47
11	27	F	8	2	39	15	81	56	123	84
12	35	M	9	3	37	16	64	34	132	92
13	33	F	7	2	35	19	78	54	131	40
14	26	F	7	2	37	16	77	32	101	67
15	33	M	8	1	35	18	58	34	121	74